CLAIMS

What is claimed is:

1. An electroacoustic receiver for use in a hearing aid further including a power source, an audio input, and a signal processor wherein the receiver is driven with a switching signal having a carrier frequency, the electroacoustic receiver comprising:

a pair of spaced permanent magnets;

a coil having a tunnel therethrough, the coil comprising a conductive element having a thickness and formed into a winding, the winding including a plurality of spaced turns forming a plurality of winding layers, the plurality of spaced turns having a parasitic capacitance between individual turns and a predetermined winding pattern and a predetermined winding pitch for reducing the parasitic capacitance.

2. The electroacoustic receiver of Claim 1 wherein the winding pitch of the plurality of spaced turns includes a spacing between successive turns of at least three times the thickness of the conductive element.

3. The electroacoustic receiver of Claim 2 further comprising an insulating material between successive layers of the plurality of winding layers.

4. The electroacoustic receiver of Claim 3 further comprising an insulating element having a thickness and formed into an insulating winding including a plurality of insulating turns located in the spacing between successive turns of the plurality of spaced turns of the conductive element.

5. The electroacoustic receiver of Claim 4 further comprising an insulating film wrapped about the conductive element.

6. The electroacoustic receiver of Claim 5 wherein the predetermined winding pattern comprises a plurality of electrically connected spaced winding modules each module comprising a plurality of individual turns forming a plurality of individual layers.

7. The electroacoustic receiver of Claim 6 wherein each spaced winding module comprises a bank winding.

8. The electromagnetic receiver of Claim 7 wherein the bank winding comprises a second predetermined winding pattern comprising an end portion including a first layer of turns adjacent the tunnel and wound about the tunnel in a first direction along a length of the tunnel and a second layer of turns disposed radially outwardly from the first layer of turns and wound about the first layer of turns in a second direction along the length of the tunnel which is opposite to the first direction, the winding pattern further comprising a second portion including a plurality of turns forming a plurality of layers and progressing in the first direction along the length of the tunnel.

9. The electroacoustic receiver of Claim 1 further comprising an insulating material between successive layers of the plurality of winding layers.

10. The electroacoustic receiver of Claim 9 further comprising an insulating element having a thickness and formed into an insulating winding including a plurality of insulating turns located in the spacing between successive turns of the plurality of spaced turns of the conductive element.

11. The electroacoustic receiver of Claim 10 further comprising an insulating film wrapped about the conductive element.

12. The electroacoustic receiver of Claim 11 wherein the predetermined winding pattern comprises a plurality of electrically connected spaced winding

modules each module comprising a plurality of individual turns forming a plurality of individual layers.

13. The electroacoustic receiver of Claim 12 wherein each spaced winding module comprises a bank winding.

14. The electromagnetic receiver of Claim 13 wherein the bank winding comprises a second predetermined winding pattern comprising an end portion including a first layer of turns adjacent the tunnel and wound about the tunnel in a first direction along a length of the tunnel and a second layer of turns disposed radially outwardly from the first layer of turns and wound about the first layer of turns in a second direction along the length of the tunnel which is opposite to the first direction, the winding pattern further comprising a second portion including a plurality of turns forming a plurality of layers and progressing in the first direction along the length of the tunnel.

15. The electroacoustic receiver of Claim 1 further comprising an insulating element having a thickness and formed into an insulating winding including a plurality of insulating turns located between successive turns of the plurality of spaced turns of the conductive element.

16. The electroacoustic receiver of Claim 15 further comprising an insulating film wrapped about the conductive element.

17. The electroacoustic receiver of Claim 16 wherein the predetermined winding pattern comprises a plurality of electrically connected spaced winding modules each module comprising a plurality of individual turns forming a plurality of individual layers.

18. The electroacoustic receiver of Claim 17 wherein each spaced winding module comprises a bank winding.

19. The electromagnetic receiver of Claim 18 wherein the bank winding comprises a second predetermined winding pattern comprising an end portion including a first layer of turns adjacent the tunnel and wound about the tunnel in a first direction along a length of the tunnel and a second layer of turns disposed radially outwardly from the first layer of turns and wound about the first layer of turns in a second direction along the length of the tunnel which is opposite to the first direction, the winding pattern further comprising a second portion including a plurality of turns forming a plurality of layers and progressing in the first direction along the length of the tunnel.

20. The electroacoustic receiver of Claim 1 further comprising an insulating film wrapped about the conductive element.

21. The electroacoustic receiver of Claim 20 wherein the predetermined winding pattern comprises a plurality of electrically connected spaced winding modules each module comprising a plurality of individual turns forming a plurality of individual layers.

22. The electroacoustic receiver of Claim 21 wherein each spaced winding module comprises a bank winding.

23. The electromagnetic receiver of Claim 22 wherein the bank winding comprises a second predetermined winding pattern comprising an end portion including a first layer of turns adjacent the tunnel and wound about the tunnel in a first direction along a length of the tunnel and a second layer of turns disposed radially outwardly from the first layer of turns and wound about the first layer of turns in a second direction along the length of the tunnel which is opposite to the first direction, the winding pattern further comprising a second portion including a

plurality of turns forming a plurality of layers and progressing in the first direction along the length of the tunnel.

24. The electroacoustic receiver of Claim 1 wherein the predetermined winding pattern comprises a plurality of electrically connected spaced winding modules each module comprising a plurality of individual turns forming a plurality of individual layers.

25. The electroacoustic receiver of Claim 24 wherein each spaced winding module comprises a bank winding.

26. The electromagnetic receiver of Claim 25 wherein the bank winding comprises a second predetermined winding pattern comprising an end portion including a first layer of turns adjacent the tunnel and wound about the tunnel in a first direction along a length of the tunnel and a second layer of turns disposed radially outwardly from the first layer of turns and wound about the first layer of turns in a second direction along the length of the tunnel which is opposite to the first direction, the winding pattern further comprising a second portion including a plurality of turns forming a plurality of layers and progressing in the first direction along the length of the tunnel.

27. The electroacoustic receiver of Claim 1 wherein the predetermined winding pattern of the conductive element comprises an end portion including a first layer of turns adjacent the tunnel and wound about the tunnel in a first direction along a length of the tunnel and a second layer of turns disposed radially outwardly from the first layer of turns and wound about the first layer of turns in a second direction along the length of the tunnel which is opposite to the first direction, the winding pattern further comprising a second portion including a plurality of turns forming a plurality of layers and progressing in the first direction along the length of the tunnel.

28. A method of reducing the current flow from and increasing the life of a battery provided in a hearing aid having an audio input, and a signal processor, the method comprising the steps of:

providing an electroacoustic receiver driven by a switching signal having a carrier frequency, the receiver comprising a pair of spaced magnets, a coil having a tunnel therethrough, and a reed armature having a central portion that extends through the coil; and

reducing a parasitic capacitance exhibited by the receiver coil by providing a predetermined winding pattern of a conductive element including a plurality of successive turns forming a plurality of successive winding layers and a predetermined winding pitch.

29. The method of Claim 28 wherein the predetermined winding pitch includes a spacing between successive turns of at least three times a thickness of the conductive element.

30. The method of Claim 28 wherein the reducing a parasitic capacitance step includes providing an insulating material between adjacent layers of the plurality of successive winding layers.

31. The method of Claim 28 wherein the reducing a parasitic capacitance step includes providing an insulating element having a thickness and formed into an insulating winding including a plurality of insulating turns located in the between adjacent turns of the plurality of successive turns of the conductive element.

32. The method of Claim 28 wherein the reducing a parasitic capacitance step includes providing an insulating film wrapped about the conductive element.

33. The method of Claim 28 wherein the predetermined winding pattern comprises a plurality of electrically connected spaced winding modules each

module comprising a plurality of individual turns forming a plurality of individual layers.

34. The method of Claim 28 wherein the predetermined winding pattern is a bank winding.

35. The method of Claim 34 wherein the ban winding comprises a second predetermined winding pattern comprising an end portion including a first layer of turns adjacent the tunnel and wound about the tunnel in a first direction along a length of the tunnel and a second layer of turns disposed radially outwardly from the first layer of turns and wound about the first layer of turns in a second direction along the length of the tunnel which is opposite to the first direction, the winding pattern further comprising a second portion including a plurality of turns forming a plurality of layers and progressing in the first direction along the length of the tunnel.

36. An electroacoustic receiver comprising:

a pair of spaced permanent magnets;

a coil having a tunnel therethrough, the coil comprising a wire having a thickness and formed into a wire winding, the wire winding including a plurality of individual turns having a winding pitch wherein a space between individual turns is at least three times the thickness of the wire; and

a reed armature having a central portion which extends through the coil.

37. An electroacoustic receiver comprising:

a pair of spaced permanent magnets;

a coil having a tunnel therethrough, the coil comprising a plurality of spaced, electrically connected winding modules; and

a reed armature having a central portion which extends through the coil.

38. An electroacoustic receiver comprising:

a pair of spaced permanent magnets;

a coil having a tunnel therethrough, the coil comprising a winding of a wire, the winding having an end portion formed by a first plurality of individual turns originating at a point adjacent the tunnel and expanding radially outwardly to form a boundary layer, thereafter the wire being wound in second succession of individual turns to form a plurality of horizontally disposed layers; and

a reed armature having a central portion which extends through the coil.

39. An electroacoustic receiver comprising:

a pair of spaced permanent magnets;

a coil having a tunnel therethrough, the coil comprising a first wire winding layer, a second winding layer, and an insulating layer wherein the insulating layer is positioned between the first and second winding layers; and

a reed armature having a central portion which extends through the coil.

40. An electroacoustic receiver comprising:

a pair of spaced permanent magnets;

a coil having a tunnel therethrough, the coil a plurality of alternating turns of conductive material and non-conductive material; and

a reed armature having a central portion which extends through the coil.